1. A flywheel energy storage system for preventing power interruptions to a load from interruptions of primary power, comprising:

a flywheel that is supported for rotation about an axis on a bearing system, and a motor-generator having a stator and a rotor coupled with said flywheel,

said motor-generator has multiple stationary armature windings and a field coil;

said field coil generates flux that passes through said armature windings as said rotor rotates;

a rectifier connected to said primary power for delivering rectified primary power to a DC buss;

an inverter connected to said DC buss for converting power from said DC buss to output power to said load;

a synchronous inverter for delivering synchronized power to excite said armature windings during recharging of said flywheel;

a field controller for maintaining power to said field coil during standby operation such that the current to said field coil remains substantially constant during a period including immediately before an interruption of primary power and immediately after an interruption of primary power.

2. A flywheel energy storage system as described in claim 1 wherein:

said field controller includes a speed sensor for monitoring rotational speed of said flywheel and varying electrical power to said field coil to maintain a substantially constant back emf in said armature windings during an interruption of said primary power.

3. A flywheel energy storage system as described in claim 2 wherein:

said field controller varies electrical current to said field coil approximately inverse linearly with said rotational speed of said flywheel.

4. A flywheel energy storage system as described in claim 1 wherein:

said field coil has a weight Wfc in pounds, and said flywheel has a weight Wfw in pounds, wherein Wfc/Wfw > 0.25.

5. A flywheel energy storage system as described in claim 1 wherein:

said armature windings are located in a magnetic air gap formed between two surfaces of said rotor that rotate together.

6. A flywheel energy storage system as described in claim 5 wherein:

said flux crosses only a single magnetic airgap in said motor/generator.

7. A flywheel energy storage system as described in claim 1 wherein:

said field coil has a weight Wfc in pounds, and said flywheel energy storage system has a 15 second output power capability P in kilowatts, wherein Wfc/P > 0.60.

8. A flywheel energy storage system as described in claim 1 wherein:

said field coil has an inductance Ifc, and said armature windings has an individual phase inductance Iap, wherein Ifc/Iap> 25,000.

9. A flywheel energy storage system for preventing power interruptions to a load from interruptions of primary power, comprising a flywheel that is supported for rotation about an axis on a bearing system, and a motor-generator having a rotor coupled with said flywheel, and a stator;

said motor-generator has multiple stationary armature windings and a field coil;

said field coil generates flux that passes through said armature windings as said rotor rotates;

said armature windings are excited by a synchronous inverter connected to a DC buss that receives rectified primary power from a rectifier connected to said primary power;

an inverter connected to said DC buss converts power from said DC buss to output power to said load;

whereby, said field controller maintains power to said field coil when said primary power is not interrupted such that the back emf of said armature windings is equal to at least 75% of the voltage of said DC buss.

10. A flywheel energy storage system as described in claim 9 wherein:

said field controller includes a speed sensor for monitoring rotational speed of said flywheel and varying electrical power to said field coil to maintain a substantially constant back emf in said armature windings during an interruption of primary power.

11. A flywheel energy storage system as described in claim 9 wherein:

said field coil has a weight Wfc in pounds, and said flywheel energy storage system has a 15 second output power capability P in kilowatts, wherein Wfc/P > 0.60.

12. A flywheel energy storage system as described in claim 9 wherein:

said field coil has a weight Wfc in pounds, and said flywheel has a weight Wfw in pounds, wherein Wfc/Wfw > 0.25.

13. A flywheel energy storage system as described in claim 9 wherein:

said armature windings are located in a magnetic air gap formed between two surfaces of said rotor that rotate together.

14. A flywheel energy storage system as described in claim 9 wherein:

said field coil has an inductance Ifc, and said armature windings has an individual phase inductance Iap, wherein Ifc/Iap> 25,000.

15. A flywheel energy storage system for preventing power interruptions to a load from interruptions of primary power, comprising a flywheel that is supported for rotation about an axis on a bearing system, and a motor-generator having a rotor coupled with said flywheel, and a stator;

said motor-generator has multiple stationary armature windings and a field coil;

said field coil generates flux that passes through said armature windings as said rotor rotates;

said armature windings are excited by a synchronous inverter connected to a DC buss that receives rectified primary power from a rectifier connected to said primary power;

an inverter connected to said DC buss converts power from said DC buss to output power to said load;

whereby, said field coil has an inductance Ifc, and said armature windings has an individual phase inductance Iap, wherein Ifc/Iap> 25,000.

16. A flywheel energy storage system as described in claim 15 wherein:

said field coil has an inductance Ifc, and said armature windings has an individual phase inductance Iap, wherein Ifc/Iap> 100,000.

17. A flywheel energy storage system as described in claim 15 wherein:

said field coil has a weight Wfc in pounds, and said flywheel has a weight Wfw in pounds, wherein Wfc/Wfw > 0.25.

18. A flywheel energy storage system as described in claim 15 wherein:

said armature windings are located in a magnetic air gap formed between two surfaces of said rotor that rotate together.

19. A flywheel energy storage system as described in claim 15 wherein:

said field controller includes a speed sensor for monitoring rotational speed of said flywheel and varying electrical power to said field coil to maintain a substantially constant back emf in said armature windings during an interruption of primary power.

20. A flywheel energy storage system as described in claim 15 wherein:

said field coil has a weight Wfc in pounds, and said flywheel energy storage system has a 15 second output power capability P in kilowatts, wherein Wfc/P > 0.60.